Efforts to Streamline Permitting of Geothermal Projects in the United States

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Abstract

Geothermal permitting timelines in the United States can be a deterrent to new investment, with geothermal project development taking as long as seven to ten years. Starting in 2005, the U.S. Congress passed the Energy Policy Act of 2005 (EPAct 2005), which in part aimed to streamline aspects of the geothermal permitting process on federally managed public lands. This article summarizes the general regulatory process for developing geothermal projects in the United States and thereafter discusses efforts proposed or undertaken by the U.S. Congress, U.S. Forest Service, U.S. Bureau of Land Management, state governments, and project developers to increase permitting efficiency.

1. Introduction

Geothermal project development timelines in the United States can take as long as seven to ten years, which can be a deterrent to new investment.[1] Geothermal resource development is subject to many federal, state, and/or local laws and regulations depending on the location of the resource. A recent geospatial analysis conducted by the National Renewable Energy Laboratory (NREL) utilizing the 2008 United States Geological Survey Assessment of Moderate and High-Temperature Geothermal Resources of the United States (USGS 2008) revealed that 63% of the identified and undiscovered geothermal resources are on federally managed public land, 9% on state land, and 28% on private land. The location of the geothermal resource not only determines the level of government regulation, but also whether the resource is defined as a mineral right, water right, or sui generis,[2] each of which may require different lease structures, permitting requirements, or other regulatory approvals. Further complicating the matter, the land where the geothermal resource is located may have separate surface and subsurface owners (commonly referred to as a split estate) or may be on surface land subdivided into smaller sections with different owners. As a result, the permitting requirements for each project location are different.

Both the federal government (through acts of the U.S. Congress and agency-led efforts) and state governments have already developed policies and initiatives that increase efficiency or streamline geothermal permitting. However, other policies and initiatives to

[1] Katherine Young, et al., *Geothermal Permitting and NEPA Timelines*, 38, GRC Transactions, 893, 894 (2014).
[2] Black's Law Dictionary defines the term "sui generis" to mean of its own kind or class. In the context of geothermal this means any classification of geothermal resources besides a mineral right or water right. *Sui generis*, *Black's Law Dictionary* (10th ed. 2014).

further improve the geothermal permitting process have been proposed or are currently underway.

This article discusses:

- The type of permits and regulatory approvals (including the federal and state environmental review process) that a geothermal project may require;
- Previously enacted and proposed federal legislation aimed at streamlining federal geothermal permitting;
- Efforts by the U.S. Bureau of Land Management (BLM) to improve geothermal permitting; and
- Additional strategies proposed or utilized to help streamline geothermal permitting.

2. Permits and Associated Environmental Review Requirements

Permitting and environmental review requirements depend partly on whether the surface and/or sub-surface land are public (i.e., federal or state) or private land. This section provides a brief overview of permitting and regulatory requirements for federal, state, and private land for geothermal development.

2.1 The National Environmental Policy Act of 1969

The National Environmental Policy Act of 1969 (NEPA) is a procedural statute[3] that requires federal agencies to review the potential environmental impacts of proposed actions to determine whether the actions will "significantly affect the quality of the human environment."[4] The NEPA process integrates natural and social sciences, environmental design arts (in planning and decision-making), agency cooperation, and public comment in order to achieve its goals.[5] The NEPA process is applicable to all "major federal actions" significantly affecting the human environment.[6] In geothermal development, a major federal action typically occurs when the project is on federal land (requiring an approval from a federal agency for leasing or permitting) or where federal funds are contributed to the project (e.g., a grant from the U.S. Department of Energy (DOE)). When there is a federal nexus, the federal agency providing the regulatory approval or funding is responsible for completing an environmental review document either in the form of an Environmental Assessment (EA) or Environmental Impact Statement (EIS). In certain circumstances, a statute or regulation may provide for a Categorical Exclusion (CX) from the requirements of NEPA, or an agency may rely on an existing NEPA document through a Determination of NEPA Adequacy (DNA). Table 1 provides a basic summary of these NEPA-related document types, which are explained in more detail in later sections.

Table 1: Summary of NEPA-related Environmental Review Types

[3] NEPA is referred to as a procedural statute because it does not contain substantive provisions to protect the human environment. Instead, NEPA only requires a federal agency to review and analyze the environmental impacts of the proposed activity and consider alternatives to the proposed action. 42 U.S.C. §§ 4321 and 4331.

[4] 42 U.S.C. § 4332

[5] *Id*.

[6] *Id*.

Review Type	Description	Approximate Timeframe	Example Geothermal Permit Utilizing Review Type
Determination of NEPA Adequacy (DNA)	Previous NEPA analysis adequately addresses the direct and cumulative impacts of the proposed activity.	1 month*	Geothermal Drilling Permit at existing permitted project location with adequate environmental analysis
Categorical Exclusion (CX)	A "category of actions which do not individually or cumulatively have a significant effect on the human environment and which have been found to have no such effect in procedures adopted by a Federal agency…and for which, therefore, neither an environmental assessment nor an environmental impact statement is required." 40 C.F.R. § 1508.4.	2 months*	Notice of Intent to Conduct Geothermal Exploration Operations with no new surface disturbance
Environmental Assessment (EA)	A "concise public document for which a federal agency is responsible that provides sufficient evidence and analysis for determining whether to prepare an EIS, aids an agency's compliance with NEPA when no EIS is necessary, and facilitates the preparation of an EIS when necessary." 40 C.F.R. § 1508.9.	10 months*	Geothermal Drilling Permit for a new well
Environmental Impact Statement (EIS)	A detailed written environmental review statement as required by NEPA. The document includes the environmental impact of the proposed action, any adverse environmental effects which cannot be avoided should the proposed action be implemented, alternatives to the proposed action, the relationship between local short-term uses	25 months*	Plan of Utilization for a new power plant

	of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitments of resources involved in the proposed action. 40 U.S.C. § 4332 (2)(c).	

* Approximate timeline for NEPA-related analyses required for geothermal permit approval on BLM managed public lands.[7]

2.2 Leasing and Permitting Federally Managed Public Lands

BLM manages most federal mineral (i.e., subsurface) estates (roughly 700 million acres) and, with limited exceptions, administers permit approvals even if the surface is managed by another federal agency or is privately held.[8]

2.2.1 Land Use Planning

For BLM-managed public lands, the process typically begins with land use planning, during which the BLM creates a Resource Management Plan (RMP) to allow for geothermal development on federal land.[9] Similarly, the U.S. Forest Service (USFS) develops Forest Plans to allow for geothermal development on National Forest System lands. Development of, or an amendment to, an RMP or Forest Plan requires compliance with NEPA.[10] NEPA for RMPs or Forest Plans may take the form of an EA or an EIS depending on the scope.[11]

2.2.2 Geothermal Leasing

After land use planning is complete, but prior to leasing the parcel for development, the BLM conducts a leasing analysis either individually for the parcel or cumulatively for multiple parcels. The leasing analysis usually occurs after an entity interested in the parcel nominates the parcel for lease by submitting a lease nomination application with a description of the land to the BLM. The BLM, however, can also place land up for lease on its own initiative.[12] The leasing analysis, which may include a second NEPA review (in addition to the NEPA review conducted for the RMP), focuses on whether the land is available for leasing[13], what type of lease stipulations are required, and, generally, what

[7] Katherine Young, et al., *Geothermal Permitting and NEPA Timelines*, 38, GRC Transactions, 893, 894 (2014).
[8] Certain exceptions exist for un-leased parcels of National Forest System lands managed by United States Forest Service (*see* Memorandum of Understanding Between the U.S. Department of the Interior and U.S. Department of Agriculture: Implementation of §225 of the EPAct 2005 regarding Geothermal Leasing and Permitting) and U.S. Department of Defense lands under the jurisdiction of the Secretary of Defense (*see* 10 U.S.C. § 2917).
[9] 43 C.F.R. § 1610.
[10] 36 C.F.R. § 219.5 and 43 C.F.R. § 1610.2.
[11] Katherine Young, et al., *Geothermal Permitting and NEPA Timelines*, 38, GRC Transactions, 893, 897 (2014).
[12] 43 C.F.R. § 3205.5.
[13] A parcel may not be available for geothermal leasing if the parcel is within the following designated areas: National Monuments, National Conservation Areas, Wilderness Areas, Wilderness Study Areas,

environmental, cultural, and other resources may be impacted on the lease parcel by allowing geothermal development.[14] After completing the leasing NEPA review, the BLM is allowed to accept bids on the parcel at a competitive public auction.[15] If the parcel is not bid on at public auction, the land becomes available for noncompetitive leasing for a two-year period starting the day after the parcel did not receive bids at the public auction.[16]

On National Forest System lands, the geothermal lease nomination application is sent to the BLM, but then forwarded to the USFS for review.[17] The USFS conducts analysis to determine whether the lease acreage is open or closed based on information within agency land use plans (i.e., Forest Plans) and what additional stipulations would be necessary to meet the goals and objectives of the individual Forest Plan, before providing the appropriate BLM State Director with a consent decision and lease stipulations if the consent decision favors leasing.[18] The USFS uses the NEPA process in reviewing and making consent decisions.[19] The BLM can add additional terms, conditions, or stipulations, but cannot lease National Forest System lands without the consent of the USFS.[20]

2.2.3 Geothermal Exploration Permits

A developer may conduct exploration activities on unleased lands via a Notice of Intent to Conduct Geothermal Exploration Operations (NOI) on both BLM and National Forest System land,[21] however due to the competitive bidding process, developers often choose to wait until after the BLM issues a lease to the developer before applying for an NOI and commencing exploration activities.[22] Once the BLM issues a lease to a prospective geothermal developer, the developer typically begins to apply for geothermal exploration and drilling permits.

A developer may apply for an NOI for the following types of exploration activities:

National Recreation Areas, Wild and Scenic Rivers, the Island Park Geothermal Area, and land withdrawn under Section 17(d)(1) of the Alaska Native Claims Settlement Act. In addition, the BLM and USFS have authority to issue discretionary closures to protect other resources. MOU between the U.S. Department of the Interior and U.S. Department of Agriculture on: Implementation of Section 225 of the Energy Policy Act of 2005 Regarding Geothermal Leasing and Permitting, 9 (Apr. 14, 2006) (on file with the Bureau of Land Management and the U.S. Forest Service). *See* 43 C.F.R. §§ 3201.10, 3201.11.

[14] Katherine Young, et al., *Geothermal Permitting and NEPA Timelines*, 38, GRC Transactions, 893, 899 (2014).

[15] 43 C.F.R. § 3203.5.

[16] 43 C.F.R. § 3204.5.

[17] MOU between the U.S. Department of the Interior and U.S. Department of Agriculture on: Implementation of Section 225 of the Energy Policy Act of 2005 Regarding Geothermal Leasing and Permitting, 3 (Apr. 14, 2006) (on file with the Bureau of Land Management and the U.S. Forest Service).

[18] *See* Geothermal Steam Act of 1970, 30 U.S.C. § 1014 (b) and 43 C.F.R. § 3201.10.

[19] 36 C.F.R. § 220 et seq.

[20] Geothermal Steam Act of 1970, 30 U.S.C. § 1014 (b).

[21] Developers proposing to conduct exploration under an NOI on National Forest System lands must submit the application directly to the USFS for review and approval. Under these circumstances, the USFS serves as the lead agency under NEPA. *Id.* at 6.

[22] On BLM-managed public lands, a developer may also apply for an NOI for a parcel already leased for geothermal resource development by another entity. 43 C.F.R. § 3250.11.

- Geophysical operations;
- Drilling temperature gradient wells (TGWs);[23]
- Drilling holes used for explosive charges for seismic exploration; and
- Core drilling or any other drilling method, so long as the well is not used for geothermal resource production.[24]

A developer may not utilize the NOI process for any drilling activity that touches the geothermal reservoir, directly tests the geothermal resource, or involves drilling of production or injection wells.[25] The NOI may include a request for related construction of roads and trails and transit by vehicles over public land.

2.2.3.1 Categorical Exclusions for Geothermal Exploration

Activities allowed under CXs can be established by the U.S. Congress or through rulemaking by federal agencies. The availability of CXs varies by activity (e.g., oil and gas, mining, or geothermal) and by agency. BLM regulations include one CX for geothermal exploration that applies to explorations activities covered under an NOI. The BLM uses this CX for all geophysical activities and temperature gradient wells, where the activity does not include new surface disturbance (including new well pads) and the activity does not trigger any extraordinary circumstances[26] preventing usage of the CX. However, the CX is only applicable where the exploration operations include no temporary or new road construction.[27]

In addition to the BLM, the USFS authorizes CXs of certain geothermal exploration activities on unleased land, including, "short-term (1 year or less) mineral, energy, or geophysical investigations and their incidental support activities that may require cross-

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[23] In 1998, the BLM removed a 500-foot depth limit for temperature gradient holes and replaced the depth limitation with "any depth that BLM may approve." This provision provides the BLM with discretion to attach conditions of approval, depth limitations, or deny the NOI application and require the submission of a geothermal drilling permit application. The BLM further clarified this position in 2016, with the release of Instruction Memorandum (IM) 2016-71 Geothermal Temperature Gradient Well Permitting and Operations Requirements. IM 2016-71 provides updated protocols for drilling TGWs and re-affirms that while TGWs may be drilled to a depth of greater than 500 feet, the NOI process cannot be utilized to come into direct contact with the geothermal resource (i.e., the NOI process cannot be utilized for resource assessment or confirmation activities such as flow testing or direct observation). Bureau of Land Management, *Instruction Memorandum: Geothermal Temperature Gradient Well Permitting and Operating Requirements*, 2016-71 (March, 2016); Wyndy Rausenberger, Workshop: *Geothermal Leasing, Unitization, and Water Use Legal Issues*, 5 (Sept. 26-27, 2014).

[24] 43 C.F.R. § 3250.14 and 43 C.F.R. § 3200.1.

[25] *Id*. at 3.

[26] Extraordinary circumstances are a list of resources that when significantly impacted prevent the use of the categorical exclusion. BLM extraordinary circumstances that may prevent the use of a categorical exclusion, include significant impacts on: environmentally sensitive resources such as historic or cultural resources; park, recreation, or refuge land; wilderness areas; wild or scenic rivers; national landmarks and national monuments; migratory birds and species listed, or proposed to be listed, on the list of endangered or threatened species; and activities with highly uncertain and potentially significant environmental effects or that involve unique or unknown environmental risks. For a complete list of BLM extraordinary circumstances. *See* 43 C.F.R. § 46.215.

[27] Department of Interior, *Departmental Manual, National Environmental Policy Act of 1969, Managing the NEPA Process – Bureau of Land Management*, Part 516 DM 11.9 (May 8, 2008).

country travel by vehicles and equipment, construction of less than 1 mile of low standard road, or use and minor repair of existing roads."[28] Unlike the BLM CX, the USFS CX includes road repair or construction to reach sites for drilling core holes, temperature gradient wells, and seismic shot holes.[29] Due to the relatively short timeframe for approval of activities under a CX, this is often the developer-preferred method of permitting for as many activities as possible.

2.2.4 Geothermal Drilling Permits

In order to drill into the geothermal resource, the BLM requires a geothermal drilling permit (GDP).[30] A GDP requires the completion of an EA, EIS, or a DNA (if a previous NEPA analysis contemplated the direct and cumulative impacts of drilling the proposed well). A GDP is required for any geothermal well and related activities for the purpose of performing flow tests, producing geothermal fluids, or injecting fluids into the geothermal reservoir.[31]

2.2.5 Geothermal Utilization

Finally, before the geothermal project can develop a power plant, the BLM requires the project to receive an approved Plan of Utilization (POU) that describes how the project will develop the geothermal resource for electric generation.[32] Utilization may include production and injection wells, power plant and transmission line construction, as well as other necessary support facilities.[33] Utilization may include a construction permit, site license, and a commercial use permit.[34] The construction of a power plant may require the completion of an EA or an EIS depending on the potential impacts of the project.

Figure 1 outlines the several stages of NEPA analyses described in this section.

[28] 36 C.F.R. § 220.6(e)(8).
[29] *Id.*
[30] 43 C.F.R. § 3261.
[31] 43 C.F.R. § 3260.10.
[32] 43 C.F.R. § 3270-74.
[33] Katherine Young, et al., *Geothermal Permitting and NEPA Timelines*, 38, GRC Transactions, 893, 896 (2014).
[34] *Id*.

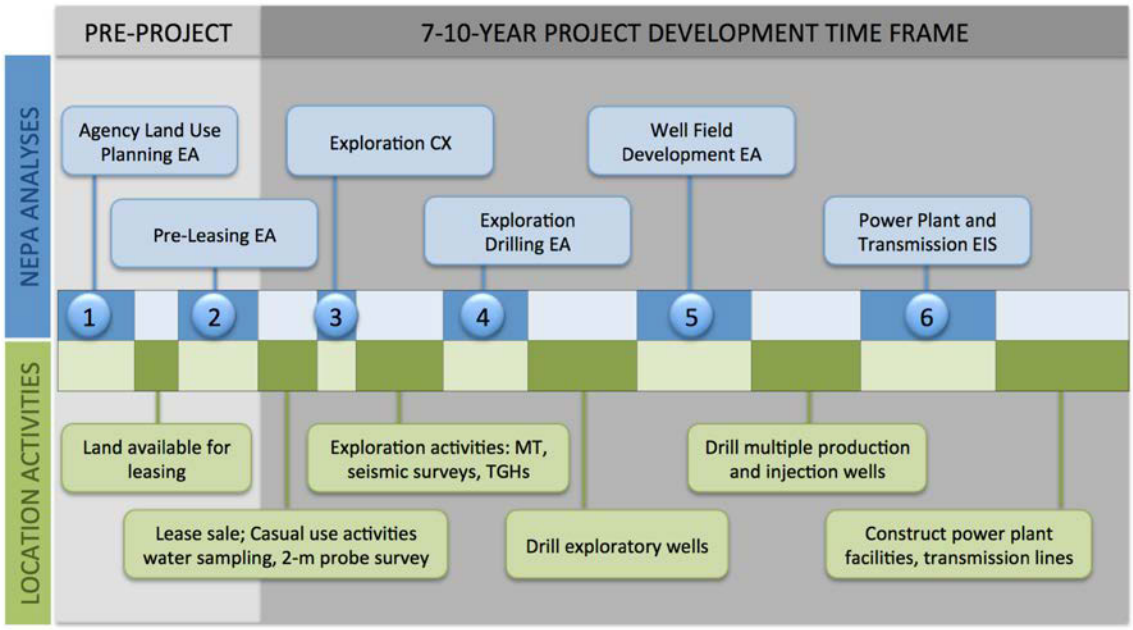

Figure 1: Example timeline of permitting a geothermal resource on federal lands illustrating that a single location could conceivably trigger NEPA analysis six separate times. Often data from each activity will provide the required information for the next permit application (e.g., exploration activities will help to target exploration well locations).[35]

2.3 State Permitting and Regulation

State regulatory authorities play a significant role in permitting and approving geothermal projects, regardless of whether the geothermal project is located on federal, state, or private land.

Similar to projects located on federally managed public lands, state and local government authorities develop land use plans for leasing state or local land for geothermal resource development. State and local leasing requirements vary by jurisdiction and may utilize competitive or non-competitive processes.[36] When projects are located on state or private land, the state typically plays a role in approving permits for invasive exploration activities (e.g., drilling a temperature gradient well or core hole) or production well drilling.[37] Non-invasive exploration activities (e.g., seismic surveys or magnetic surveys) may not require state approval, particularly if the exploration will take place on private land.[38] In addition, in states where geothermal resources are defined as a water right (or

[35] Katherine Young, et al., *Geothermal Permitting and NEPA Timelines*, 38, GRC Transactions, 893, 894 (2014).
[36] For example, in Oregon, the state employs a competitive geothermal leasing process for "geothermal resources that have a high probability of geothermal resource development", while all other Oregon state lands utilize a default noncompetitive geothermal leasing process. OAR § 141-075-0520 and OAR § 141-075-0010 et seq.
[37] For example, in California an approved NOI is required for exploratory wells, observation wells, injection wells, and development wells on state and private land. 14 CCR § 1931. Similarly, Idaho requires a Permit to Drill for Geothermal Resources for any exploration, injection, or production well on state and private land. IDAPA § 37.03.04.
[38] For example, in Alaska a geophysical exploration permit is required for conducting a seismic survey only on un-leased *state lands.* 11 AAC § 96.007. Similarly, in Oregon an exploration permit (or lease) is only

where low-temperature geothermal resources are defined as a water right) the state may require a permit or authorization to extract the geothermal fluid.[39]

Beyond permits and approvals required to extract the resource from state or private land, many state permits and regulatory approvals apply even if the resource is on federal land. A geothermal project may be subject to state-level permits or approvals for air quality, water quality, waste disposal or injection, power plant construction and operation, and transmission line development. These approvals include delegation of federal statutes to state authorities, including the Clean Water Act, Clean Air Act, and Safe Drinking Water Act (for underground injection control wells). States may also require certification from a public utility regulatory authority (such as a public utility commission) and/or require an energy facility siting authorization.[40]

Similar to NEPA, some states, including California, Hawaii, and Montana, require compliance with a state environmental review process before a state agency can license or permit geothermal project activities. If the project has a federal nexus, it would be subject to both the federal NEPA environmental review and the state environmental review processes.

Due to the vast number of permits and approvals required for a geothermal project, some states, including Hawaii and Alaska, have created renewable energy or large project permit coordinating offices to assist in coordinating timelines and disseminating information to the appropriate state and federal regulatory agencies, which have helped to reduce permitting timelines.[41]

3. Previously Implemented and Proposed Federal Legislation

Understanding the challenges associated with geothermal permitting, the U.S. Congress has passed legislation to assist in expediting geothermal development and has proposed additional measures that have been unable to garner the requisite support to become law. This section highlights legislative changes incorporated into the Energy Policy Act (EPAct) of 2005 as well as more recently proposed geothermal legislation that failed or has yet to become law.

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required on *state lands* where the exploration activities will disturb more than one surface acre or involve any drilling greater than 50 feet in depth. ORS § 517.705.

[39] For example, in Idaho the use of geothermal resources of between 85 degrees and 212 degrees Fahrenheit at the well bottom are classified as water and may require a permit to appropriate water. IC § 42-201 et seq. Similarly, in New Mexico the use of geothermal resources under 250 degrees Fahrenheit where any part of the groundwater aquifer is less than 2,500 feet below the surface, or greater than 2,500 feet if the water is potable, are classified as water and may require a permit to appropriate water. NM Stat. § 72-12-1 et seq.

[40] For example, the California Energy Commission licenses or approves county-level licensing procedures for thermal power plants (including geothermal power plants) with a net generating capacity of 50 megawatts or more, and all related facilities dedicated or essential to the operation of the thermal power plant, including the transmission lines to the first point of interconnection with the electric grid. Cal Pub Res. § 25500 et seq.

[41] *See* Aaron Levine, et al., *Coordinating Permit Offices and the Development of Utility-Scale Geothermal Energy*, 37, GRC Transactions, 795, 796, 798 (2013).

3.1 Geothermal Provisions in EPAct 2005

Section 225 of EPAct 2005 laid the foundation for increased coordination of geothermal leasing and permitting between the USFS and the BLM by requiring the Secretary of Interior (who oversees the BLM) and the Secretary of Agriculture (who oversees the USFS) to enter into a memorandum of understanding (MOU) for the administration of leasing and permitting on National Forest System lands. In enacting Section 225, Congress required the MOU between the two agencies to establish:

- Administrative procedures for processing geothermal lease applications on National Forest System lands;
- A 5-year program for geothermal leasing of National Forest System lands;
- A program for reducing the backlog of geothermal lease applications on National Forest System lands by 90% within five years of enactment[42]; and
- A joint data retrieval system capable of tracking lease and permit applications.

In addition, Section 234 of EPAct 2005 created a program to fund the implementation of geothermal programs by the USFS and BLM for a period of five years.[43]

3.1.1 Memorandum of Understanding between the BLM and USFS

In furtherance of Section 225, the Secretaries of Interior and Agriculture entered into an MOU in April 2006. The MOU set a number of goals for the administration of National Forest System lands, in part including:

- Increase efficiency and minimize duplication of the geothermal leasing process;
- Establish interagency coordination mechanisms;
- Develop a more consistent approach among the BLM and USFS as well as greater certainty in leasing and permitting processes; and
- Develop a joint interagency data retrieval system to track application progress.[44]

The MOU provides details of each agency's roles and responsibilities in the leasing and permitting of geothermal resources on National Forest System lands as well as each agency's responsibilities in the associated environmental reviews required under NEPA.[45] In addition, the MOU provides designated USFS staff with access to a number of BLM databases, including: The Automated Fluid Minerals Support System (AFMSS), which includes the Geothermal Resources Automated Support System (GRASS) database; the Legacy Rehost 2000 (LR200) database; the National Integrated Land System transaction and reporting systems; and other data systems for managing geothermal resources.

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[42] The Energy Policy Act of 2005 was enacted on August 8, 2005.
[43] Although the U.S. Congress initially created the fund to with the intention of it continuing for a period of five years, the fund was only available for four years. Kermit Witherbee, et al., *Funding Mechanisms for Federal Geothermal Permitting*, 37, GRC Transactions, 655, 661 (2013).
[44] MOU between the U.S. Department of the Interior and U.S. Department of Agriculture on: Implementation of Section 225 of the Energy Policy Act of 2005 Regarding Geothermal Leasing and Permitting, 9-10 (Apr. 14, 2006) (on file with the Bureau of Land Management and the U.S. Forest Service).
[45] *Id*. at 3-10.

The MOU has assisted geothermal development on federally-managed public lands by reducing duplication of effort, increasing communication between the BLM and USFS, and providing greater access to data required to regulate and track geothermal resource development.

3.1.2 Programmatic EIS for Geothermal Leasing in the Western United States

As discussed in the introduction to 3.1, Section 225 of EPAct 2005 required a program for reducing the backlog of geothermal lease applications on National Forest System lands by 90% within 5 years of enactment. In furtherance of this requirement, in October 2008, the U.S. Department of Interior (DOI) and the U.S. Department of Agriculture finalized a Programmatic EIS (PEIS) for Geothermal Leasing in the Western United States.[46] The PEIS went beyond the basic requirements of Section 225 to reduce the backlog on National Forest System lands and covered 530 million acres of BLM and USFS lands within 12 western states with geothermal potential (Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming).[47] The PEIS evaluated alternatives for which BLM lands were *open*, *open with constraints*, or *closed for geothermal leasing* through 122 proposed amendments to BLM land use plans (i.e., RMPs) as well as site-specific environmental analysis for 19 pending geothermal lease applications filed prior to January 1, 2005.[48] The analysis in the PEIS addressed both direct and indirect impacts of foreseeable ground disturbing activities, including exploration, drilling, and utilization.[49] The PEIS only analyzed geothermal leasing on a planning area basis (with more narrow analysis of the 19 pending geothermal lease applications), so the impacts of site-specific activities would still require a new or supplemental NEPA review during the permitting review process for exploration, drilling, and utilization on the lease acreage covered in the PEIS. The supplemental analysis could "tier" to the PEIS to avoid duplicative analysis. Under the Council on Environmental Quality's NEPA implementing regulations, a broad EIS can summarize issues previously analyzed and cite the previous environmental review in order to focus on the issues specific to the subsequent action.[50] In addition, for National Forest System lands managed by the USFS, the analysis only determined whether the lands were open or closed to leasing based on statutes, regulations, and orders.[51] The USFS then needed to conduct additional analyses to determine whether the lease acreage was *administratively* open or closed based on information within agency land use plans (i.e., Forest Plans) and what additional stipulations would be necessary to meet the goals

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[46] BLM and USFS, *Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States*, ES-3 (2008).
[47] *Id.*
[48] *Id.*
[49] *Id.*
[50] 40 C.F.R. § 1502.20.
[51] An exception to this included pending geothermal leasing applications on National Forest System land and BLM managed public land for which a determination of whether the lease acreage is administratively open or closed to development and site-specific lease stipulations were formulated. This allowed the USFS to make consent decisions and allowed the BLM to make leasing decisions for both BLM and USFS managed land. BLM and USFS, *Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States*, I-26 (2008).

and objectives of the individual Forest Plan before providing the BLM with a consent decision.[52]

The PEIS cleared a large backlog of geothermal lease nominations on National Forest System lands as well as enabled over 100 land use planning amendments to BLM RMPs, streamlining the NEPA process for pre-leasing analysis through enabling tiering to the PEIS for many leasing determinations. Tiering allowed the BLM to not duplicate any analysis completed as part of the PEIS and allowed agency staff to focus on new issues specific to the individual determinations.

3.1.3 Geothermal Steam Act of 1970 Implementation Fund

As mentioned in 3.1, Section 234 of EPAct 2005 created the Geothermal Steam Act of 1970 Implementation Fund. Congress structured the fund to continue for five years after enactment (later reduced to four years), and the fund was supported by rentals, royalties, and other payments required for leases under the Geothermal Steam Act, with the exception of any required payments to state and county governments. Section 234 allowed for the funds to be spent without fiscal year limitation and authorized the Secretary of Interior to transfer funds to the USFS as necessary for coordination and processing of geothermal leases and use authorizations.

The implementation fund increased funding by 280-500% during the four years it was active.[53] During this time, the BLM increased the number of GDPs processed by a similar percentage.[54]

3.2 Previously Proposed Federal Geothermal Legislation

Since the enactment of EPAct 2005, several bills in the U.S. Congress have sought to streamline the federal geothermal leasing and permitting process by proposing to create CXs for geothermal activities similar to the CXs for oil and gas activities under EPAct 2005 § 390.[55] The bills discussed in this section have identified the NEPA process, which

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[52] *Id.*

[53] Kermit Witherbee, et al., *Funding Mechanisms for Federal Geothermal Permitting*, 37, GRC Transactions, 655, 661 (2013).

[54] *Id.*

[55] The EPAct 2005 § 390 CXs applicable to oil and gas development include:

- Individual surface disturbances of less than 5 acres so long as the total surface disturbance on the lease is not greater than 150 acres and site-specific analysis in a document prepared pursuant to NEPA has been previously completed;
- Drilling an oil and gas well at a location or well pad site at which drilling has occurred previously within five years prior to the date of spudding the well;
- Drilling an oil or gas well within a developed field for which an approved land use plan or any environmental document prepared pursuant to NEPA analyzed such drilling as a reasonably foreseeable activity, so long as such plan or document was approved within five years prior to the date of spudding the well;
- Placement of a pipeline in an approved right-of-way corridor, so long as the corridor was approved within five years prior to the date of placement of the pipeline; and
- Maintenance of a minor activity, other than any construction or major renovation or building or facility. Energy Policy Act of 2005, Pub. L. No. 109-58 § 390, 119 Stat. 594, 747 (2005) (codified as amended at 42 U.S.C. § 15942).

may conceivably take place as many as six times at a single project location (see Figure 1), as an impediment to geothermal development. To date, none of these bills have been voted on.

3.2.1 H.R. 1363: The Exploring for Geothermal Energy on Federal Lands Act

In 2013, during the 113th Congress, Representative Labrador (R-ID) introduced H.R. 1363: The Exploring for Geothermal Energy on Federal Lands Act to promote the timely exploration for geothermal resources under existing leases. The bill defined a Geothermal Exploration Test Project that would be categorically exempt from completing the NEPA process. A Geothermal Exploration Test Project was defined as "drilling of a well to test or explore for geothermal resources on lands leased by the DOI for the development and production of geothermal resources." The bill further limited the applicability to projects that:

- Were carried out by the leaseholder;
- Caused less than 5 acres of soil or vegetation disruption at each exploration well;
- Caused not more than an additional 5 acres of soil or vegetation disruption for access or egress to the site;
- Were no deeper than 2,500 feet and less than 8 inches in diameter;
- Did not require off-road motorized access except for on an identified off-road route;
- Did not require the construction of new roads;
- Used rubber-tired digging or drilling equipment vehicles; and
- Were completed in less than 45 days.[56]

After submission of an NOI, the BLM would have 10 days to review the proposal and notify the developer of whether the project qualifies for the CX. The bill would have required restoration of the project site within three years unless the site is subsequently used for energy development on the lease.[57]

3.2.2 S. 562: The Geothermal Exploration Opportunities Act of 2015

In 2015, during the 114th Congress, Senators Dean Heller (R-NV) and James Risch (R-ID) introduced S. 562: The Geothermal Exploration Opportunities Act of 2015 to promote exploration of geothermal resources. Similar to H.R. 1363, the bill sought to create a CX for drilling a well to test or explore for geothermal resources.[58] The CX for drilling a geothermal well to test or explore for geothermal resources was limited to projects that:

- Were carried out by the leaseholder;
- Caused less than 5 acres of soil or vegetation disruption at the location of each well;

[56] H.R. 1363, 113th Cong. § 2 (2013).
[57] *Id.*
[58] In June 2017, the language of S. 562, 114th Congress was proposed as part of S. 1460, the *Energy and Natural Resources Act of 2017* (ENRA). S. 1460, 115th Cong. § 3012 (2017) and S. 562, 114th Cong. § 3 (2015).

- Caused no more than an additional 5 acres of soil or vegetation disruption during access or egress; and
- Were completed in less than 90 days.[59]

In addition, the bill sought to create a CX for geophysical exploration and geothermal CXs similar to those passed for oil and gas in EPAct 2005 § 390. The CXs would apply to geothermal wells to test or explore for geothermal resources that were carried out by the leaseholder and:

- Caused less than 5 acres individual surface disturbance and less than 150 acres total surface disturbance for which a site-specific NEPA analysis had been prepared; or
- Involved drilling of a geothermal well at a location or well pad site at which drilling had occurred in the previous 5 years before the date of spudding the well; or
- Involved drilling a geothermal well in a developed well field for which an approved land use plan or NEPA document had analyzed drilling as a reasonably foreseeable activity and the land use plan or NEPA document was approved within 10 years before the date of spudding.[60]

All of the CXs were to be limited by the extraordinary circumstances[61] listed in 516 DM 2.3A(3) and 516 DM 2, Appendix 2.[62]

Identical to H.R. 1363, after submission of an NOI, the BLM would have 10 days to review the proposal and notify the developer of whether the project qualifies for the CX. The bill would have required restoration of the project site within three years unless the site is subsequently used for energy development on the lease.[63]

3.2.3 S. 282: The Public Land Renewable Energy Development Act

In February 2017, during the 115th Congress, Senator Dean Heller (R-NV) and seven other senators proposed a broad renewable energy bill, S. 282: The Public Land Renewable Energy Development Act to promote renewable energy development on public lands. The bill would increase funding for geothermal permit processing by amending EPAct 2005 § 234 to provide geothermal funding through 2022, supplement the October 2008 geothermal programmatic EIS for geothermal leasing by creating priority areas where development is encouraged and variance areas where development is permitted, and allow the BLM to determine that a proposed geothermal project that has been sufficiently analyzed in a programmatic EIS does not require additional NEPA analysis.[64] In addition, the bill would create a program to improve renewable energy

[59] S. 562, 114th Cong. § 3 (2015).
[60] *Id.*
[61] For example, the extraordinary circumstances listed in the departmental manual (516 DM 2) include individual actions which may have a significant impact on historic or cultural resources; park, recreation, or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; wetlands; floodplains; and national monuments (Department of Interior, 2008).
[62] S. 562, 114th Cong. § 3 (2015).
[63] *Id.*
[64] S. 282 would require that where a programmatic EIS does not sufficiently analyze the impacts of the proposed activity any additional environmental analysis must rely on the programmatic EIS to the maximum extent practicable. S. 282, 115th Cong. § 3-5 (2017).

project permit coordination through a multi-agency MOU that expands the existing BLM Renewable Energy Coordination Offices.[65]

4. BLM Permitting Improvement Efforts

Despite the U.S. Congress not passing significant geothermal legislation since EPAct 2005, the BLM has undertaken a number of efforts beyond its EPAct requirements to improve federal geothermal leasing and permitting within the agency.

Since 2005, the BLM has worked diligently to create or update MOUs with several states/state agencies applicable to geothermal development including: California, Colorado, Nevada, and Oregon. These MOUs are designed in part to eliminate duplication of effort; share data; advise state or federal counterparts of new developments, pending litigation, or other issues of concern; improve best management practices; provide a mechanism for a state to be a cooperating agency under NEPA; establish annual review and project-specific meetings; and coordinate on-site inspections.[66]

The BLM played an active role in 2012 through 2014 in assisting DOE and the National Renewable Energy Laboratory (NREL) in developing the Geothermal Regulatory Roadmap (now part of the Regulatory and Permitting Information Desktop [RAPID] Toolkit[67]), a one-stop regulatory and permit information resource that provides information and links to permit applications, administrative processes, agency guidance documents, and other related information. The BLM provided review and feedback on much of the federal geothermal permitting information contained in RAPID, which can be utilized to help provide consistent understanding among the BLM's many state, district, and field offices.

Most recently in 2016-2017, the BLM is working to develop an updated version of its GRASS database. GRASS is a database that tracks information for geothermal operations for the BLM, and it includes information concerning project locations; lease and agreement ownerships; well identification and site histories, including casing, geologic formations, resource protection, production, and injection; and operator compliance (GRASS Software User Guide). The updated version (GRASS II) will include automated workflows for GDPs and TGWs, and allow industry to electronically submit and receive updates on the status of their drilling permit. GRASS II is expected to launch between

[65] Beginning in 2009, the BLM established four renewable energy coordination offices and 5 smaller renewable energy teams to facilitate the development of renewable energy on BLM-managed public lands. The offices include BLM and other DOI (e.g., U.S. Fish and Wildlife) employees in a variety of disciplines to assist in expediting permitting. Department of Interior, *Secretary Salazar Pledges to Open Four Renewable Energy Permitting Offices, Create Renewable Energy Teams* (May 5, 2009), S. 282, 115th Cong. § 3-5 (2017).

[66] *See* MOU between the Bureau of Land Management, Colorado State Office, and Colorado Department of Natural Resources, 2011 (on file with the Bureau of Land Management and Colorado State Office); MOU between Bureau of Land Management and State of Nevada Commission on Mineral Resources, Division of Minerals, 2006, (on file with the Bureau of Land Management and State of Nevada Commission on Mineral Resources).

[67] Available at: http://www.Rapidtoolkit.org.

2018-2019. Research shows that well-designed and implemented workflow management software tools can:

- Reduce costs for processors (i.e. agencies) by 30-40%,
- Increase compliance by 40-50%,
- Reduce errors, and
- Reduce process timeframes.[68]

The goal is for GRASS II to realize many of these benefits for BLM and geothermal developers.

5. Additional Strategies to help Streamline Permitting

This section discusses additional strategies that could assist in streamlining federal geothermal permitting, including increased funding, centralized permit offices, an expansion of the current CXs, and increased use of tiering to existing NEPA documents.

5.1 Increased Funding

One noted concern to leasing and permitting geothermal resources on federally managed public lands is a lack of federal agency funding and personnel to process permits and associated environmental reviews, which results in permitting delays.[69] Increased funding to the BLM and USFS for federal geothermal permitting could take various forms, including cost-recovery fees for services rendered, set-aside funds, and new appropriations.[70]

Cost-recovery fees for services rendered, refers to an agency being reimbursed the reasonable cost of permit processing by the project developer/proponent.[71] The BLM and USFS do not currently have authorization to collect cost-recovery fees for geothermal permitting, however the BLM Rights-of-Way program does utilize cost recovery as a funding mechanism for other projects on federal lands.[72]

Set-aside funds for geothermal lease and permit processes, refers to an agency being able to utilize geothermal revenue collected by the program as opposed to the revenue being deposited in the Federal Treasury. The BLM has previously received set-aside funds, such as those authorized by U.S. Congress in the Geothermal Steam Act Implementation Fund (Section 234 of EPAct 2005) from 2006-2010 (as discussed in Section 3.1.3). The Geothermal Steam Act Implementation Fund tripled the BLM geothermal program's

[68] Julian Hooks, *Project Management Software Advantages and Disadvantages*, YAHOO SMALL BUSINESS, Feb. 20, 2013. Available at: https://smallbusiness.yahoo.com/advisor/project-management-software-advantages-disadvantages-144914106.html. Accessed March 2018.
[69] Kermit Witherbee, et al., *Funding Mechanisms for Federal Geothermal Permitting*, 37, GRC Transactions, 655, 655 (2013).
[70] *Id.*
[71] *Id.* at 661.
[72] 43 C.F.R. § 2804.14.

annual budget and allowed for a significant increase in geothermal activity on federally managed public lands.[73]

New appropriation refers to the U.S. Congress' annual appropriations process whereby the U.S. Congress funds federal agencies. Typically, a federal agency must request additional annual funding and provide a non-speculative justification for the need for the additional funding.[74]

Additional geothermal funding to the BLM and/or USFS through any of the three mechanisms has the potential to reduce permitting timeframes by adequately funding and staffing personnel to review lease nominations and permit applications.

5.2 BLM Centralized Permitting Office

BLM geothermal permitting is conducted at the local field office level, which may be costly for the BLM (e.g., duplication of skill sets, training) and the developers (e.g., working through a new process with each new field office). The creation of a centralized permitting office could help to reduce time and effort by all parties involved in geothermal development on federally managed public lands by:

- Increasing environmental compliance by using staff experienced in addressing geothermal development concerns;
- Creating efficiencies by repetition and development of expertise by core geothermal staff;
- Allowing for efficient use of BLM resources by reducing duplication of staff capabilities (i.e., train one employee on geothermal instead of in five different areas of expertise); and
- Reducing competition for staff's time.

Currently, the BLM has similar permit streamlining offices for renewable energy (Renewable Energy Coordination Offices) and oil and gas development. The offices not only include BLM personnel, but personnel from other federal agencies with regulatory responsibilities, such as the U.S. Fish and Wildlife Service, the USFS, and the U.S. Environmental Protection Agency for increased efficiency in coordination among agencies.[75]

A centralized office has the potential to reduce permitting timeframes by utilizing trained experts in geothermal permitting and dedicating full-time staff to geothermal permit processing.

[73] Kermit Witherbee, et al., *Funding Mechanisms for Federal Geothermal Permitting*, 37, GRC Transactions, 655, 660 (2013).
[74] *Id.* at 662.
[75] Aaron Levine, et al., *Coordinating Permit Offices and the Development of Utility-Scale Geothermal Energy*, 37, GRC Transactions, 795, 801 (2013).

5.3 Expansion of Existing Categorical Exclusions Through Agency Regulation

As discussed in Section 2, the BLM has one CX applicable to geothermal exploration where the activity is authorized under an NOI and does not require new well pads, access roads, or other forms of ground disturbance. The NOI process is also limited to well drilling that does not touch the geothermal resource (e.g., temperature gradient wells). As such, "resource confirmation wells" that are drilled into the reservoir and used to observe and study the geothermal resource are not covered under a CX, but instead require the approval of a GDP and the completion of a DNA, EA, or EIS. The time and cost associated with completing an EA instead of a CX (*see* Table 1) can be particularly burdensome during the exploration phase, where a developer is seeking to identify a resource and obtain financing to drill production wells and construct a power plant to utilize the geothermal resource.[76]

Though the statutory CXs in the proposed bills outlined in Section 3 would do more to streamline permitting, an alternative is to create administrative CXs at the federal agency level. For example, a new category of wells created through BLM regulations, situated between the NOI and GDP processes for resource confirmation could assist in streamlining geothermal development in the United States through reducing the time and expense associated with identifying geothermal resources on federally managed public lands. A resource confirmation well CX has the potential to significantly reduce the permitting time required to develop a geothermal project by reducing the number of times a developer must complete an EA or EIS during the course of a project.

5.4 Expanded Use of NEPA Tiering

The development of NEPA documents can be costly and time consuming. Where possible, the Council on Environmental Quality regulations encourage the use of tiering to previous NEPA documents that sufficiently analyze the proposed activity.[77] Tiering may require the completion of a supplemental EA to analyze issues not considered in the previous environmental review document or may allow for approval of the proposed activity through a DNA if the activities' individual and cumulative impacts were sufficiently analyzed in the prior environmental review. Currently, this approach is best utilized by the BLM in tiering to the 2008 PEIS or where a developer has combined exploration, production drilling, and possibly utilization into a single NEPA analysis. However, as discussed in Section 3, legislative proposals such as S. 282 have sought to expand this strategy by allowing the BLM to tier to a programmatic EIS during the permit approval phase of the project, something currently not feasible under the 2008 PEIS. The increased usage of tiering and DNAs has the potential to significantly reduce the permitting time required to develop a geothermal project.

[76] Aaron Levine and Katherine Young, *Geothermal Development and the Use of Categorical Exclusions Under the National Policy Act of 1969*, 38, GRC Transactions, 851, 851 (2014).
[77] 40 C.F.R. § 1502.20.

6. Conclusion

Over the last 12 years, dating back to EPAct 2005, the United States has made considerable efforts to streamline geothermal leasing and permitting through temporary funding increases, programmatic environmental reviews, MOUs between federal agencies, MOUs between federal agencies and individual states, and improvements to and the creation of online geothermal databases. However, streamlining the geothermal permitting process still falls short when compared to other industries (e.g., energy projects such as other renewables and oil and gas). Additional process improvements proposed by the U.S. Congress and others could have a significant impact on the time and costs associated with exploring and developing geothermal resources, particularly on federally managed public lands. The expanded use of CXs, tiering to previous NEPA documents, the creation of a centralized federal permitting office, and increased funding to the BLM and USFS for lease nomination and permit processing have the potential for improving efficiencies, leading to increased development of the untapped U.S. geothermal resource.

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8. Acronyms

BLM	Bureau of Land Management
CX	Categorical Exclusion
DNA	Determination of NEPA Adequacy
DOE	Department of Energy
EA	Environmental Assessment
EIS	Environmental Impact Statement
GDP	Geothermal Drilling Permit
GRASS	Geothermal Resources Automated Support System
NEPA	National Environmental Policy Act of 1969
NOI	Notice of Intent
NREL	National Renewable Energy Laboratory
POU	Plan of Utilization
RMP	Resource Management Plan
TGW	Temperature Gradient Well
USFS	U.S. Forest Service